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then washing away the chloral hydrate in water and growing the tips in sawdust, NĚMEC found that after 20 hours many cells have become binucleate. After 27 hours few cells are binucleate, but many contain large nuclei which contain 28 chromosomes, twice the *2x* number. After 40 hours the mitoses show regularly 14 chromosomes, the *2x* number. NĚMEC believed the quadruple number to be brought back automatically to the *2x* number by a heterotypic mitosis.

STRASBURGER[11] has traversed the same ground, treating material of *Pisum sativum* in the same way and making an exhaustive study of all the cytological phenomena. He found cells with two nuclei and observed that such nuclei fuse to form large nuclei with 28 chromosomes, the quadruple number; but such mitoses, aside from the large number of chromosomes, present no striking peculiarities. There are abnormalities, due to the chloralization, but there are no characteristics of the heterotypic mitosis or anything else to indicate a reduction to the *2x* number; but rather there is evidence that the *4x* number, once established, persists.

The investigation of chloralized nuclei was made particularly exhaustive, that it might form a basis for comparison with nuclear phenomena in graft hybrids. An investigation of typical and chloralized nuclei of *Laburnum vulgare*, *Cytisus purpureus*, and *Laburnum Adami* presented rather constantly 48 chromosomes, the *2x* number, and showed no evidence of any fusion, reduction, or autoregulation. These plants gave no response to such chloralizing as that described for *Pisum sativum*, and after greater stimulation nuclear divisions were not resumed. The study of nuclear phenomena threw no light upon the problem of graft hybrids. There were no heterotypic mitoses and the author doubts whether heterotypic mitoses are to be found in vegetative or somatic tissues. Such mitoses as those described by English writers for malignant tumors STRASBURGER believes to be incorrectly interpreted.

The noted Mespilus at Bronvaux, recently studied by NOLL, is discussed, and here again there is no evidence of fusion or reduction. A study of the Bizzaria orange compared with "Agrumi," which is not a hybrid, showed no cytological differences; both have 16 chromosomes. The evidence showed that Bizzaria is a hybrid of sexual origin and that there is nothing to support any theory of autoregulation.

The paper gives a full account of the cytological details of graft hybrids, together with theoretical discussions which cannot be treated adequately in a brief review.—CHARLES J. CHAMBERLAIN.

Phototropism and perception of light.—FITTING has undertaken[12] to solve the question whether a localized tropic or nastic sensitiveness must be considered as a sign of localization of the *perceptive faculty* for the stimulus, and whether it is justifiable to speak of a localized phototropic irritability as merely a localization of sensitiveness to light. For this purpose he chose seedlings of *Panicum miliaceum*, in which the tip of the cotyledon alone is phototropically sensitive, and determined how the growth in length of the part not thus sensitive was affected by direct illumination and by illumination of the cotyledon tip, preliminary investigations having shown that the growth, which is restricted almost entirely to the uppermost part of the hypocotyl, is greatly retarded, and that the amount of retardation is closely dependent upon the intensity of the light. In light of moderate intensity the growth of the hypocotyl is checked almost equally, whether the cotyledon alone or the hypocotyl alone is illuminated; but only half so much as when the whole seedling is illuminated. At higher intensities, on the contrary, the illumination of the cotyledon retards the growth more; from which it is evident that the effect of the light is transmitted downward to the hypocotyl. But if one illuminates all but the uppermost 2–4^{mm} of the hypocotyl, the growth of the parts above is not retarded, and the light effect is clearly not transmitted upward. The retarding effect of illumination of the cotyledon does not proceed from its tip, which is phototropically very sensitive, for illumination of this tip alone produces far less retardation of the growth of the hypocotyl than does the illumination of a greater part of the hypocotyl. Clearly the light acts as a stimulus and both cotyledon and hypocotyl are sensitive to it. Although, as ROTHERT has shown, the hypocotyl is in general not phototropically sensitive, FITTING found that 17–25 per cent. of the seedlings whose cotyledons were darkened curved phototropically after one-sided illumination. These facts show that the distribution of *phototropic* sensitiveness does not indicate which part of the seedling perceives light. Similar results were obtained with *Sorghum Dora*, *S. vulgare*, *Zea Mays*, and *Tinantia fugax* (Commelinaceae).

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[11] STRASBURGER, EDUARD, Ueber die Individualität der Chromosomen und die Pfropfhybriden-Frage. Jahrb. Wiss. Bot. **44**:482–555. *pls. 5–7.* 1907.

[12] FITTING, H., Lichtperception und phototropische Empfindlichkeit. Jahrb. Wiss. Bot. **45**:83–136. 1907.

FITTING found nothing to indicate that phototropic sensitiveness proceeds from any other process of light perception than that which expresses itself in retardation of growth. He suggests "that the localization of phototropic sensitiveness may perhaps be referable to the fact that the polar condition characteristic of induction of phototropism can be produced only in the phototropically sensitive zone."

He discusses also the problem of etiolation, but adds nothing new, merely emphasizing the existing view that the normal form of leaves in dicotyls depends upon the direct action of light as a stimulus without the correlations which are usually considered.—C. R. B.

Javanese Anthocerotales.—As one of the results of his recent visit to the oriental tropics, CAMPBELL[13] has published an account of certain Javanese Anthocerotales. Among a number of species of Anthoceros collected at the base of Mt. Salak and also near Tjibodas, he found two forms which he believes should constitute a new genus, *Megaceros*, into which he would throw all the non-

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[13] CAMPBELL, D. H., Studies on some Javanese Anthocerotaceae. Annals of Botany **21**:467–486. *pls. 44–46.* 1907; **22**:91–102. *pls. 9, 10.* 1908.